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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/784,665	02/23/2004	Bjarte Fageraas	IO-1091US	2328

7590 02/22/2006

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EXAMINER
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LU, TONY W

ART UNIT	PAPER NUMBER
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2878

DATE MAILED: 02/22/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

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<b>Office Action Summary</b>	<b>Application No.</b> 10/784,665	<b>Applicant(s)</b> FAGERAAS ET AL.	
	<b>Examiner</b> Tony Lu	<b>Art Unit</b> 2878	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-42 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-42 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |  |
|---|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)            |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date ____ | 6) <input type="checkbox"/> Other: ____  |

## **DETAILED ACTION**

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-4,9,11,12,14-19,24,26,27,29,30-33,35,37-40 and 42 are rejected under 35 U.S.C. 102(b) as being anticipated by Weis US5675674.

With respect to claim 1, Weis discloses, in figures 1 and 6, an optical system comprising: a transducer(320) for providing digital optical signals(read col.15) by acting on an optical carrier(48); and an optical interrogator(380) coupled to the optical carrier for retrieving the digital optical data signal from the optical carrier.

With respect to claim 2, per the above discussion, Weis discloses an optical source(62) for providing the optical carrier to the transducer.

With respect to claim 3, per the above discussion, Weis discloses the transducer receives a digital electrical signal input(modulator receiving a voltage controlled switch that is opened or closed, on-off keying, read col.15, lines 1-17).

With respect to claim 4, per the above discussion, Weis discloses the transducer modulates a property(frequency and/or wavelength) of the optical carrier.

With respect to claim 9, per the above discussion, Weis discloses the transducer comprises a plurality of transducers(see 320).

With respect to claim 11, per the above discussion, Weis discloses the transducer receives a signal from one or more sensors(see figure.6).

With respect to claim 12, per the above discussion, Weis discloses the reflected light would be converted to a corresponding electrical signal by means of the photodetector(read col.18, lines 47-60). A power source charging circuit is inherently disclosed in order to provide the conversion mentioned above.

With respect to claim 14, per the above discussion, Weis discloses the one or more sensors comprise one or more of an electromagnetic sensor(read col.8, lines 10-30).

With respect to claim 15, per the above discussion, Weis discloses the transducer comprises an interface circuit(34) including an electrical-to-optical digital signal transducer(28).

With respect to claims 31-33, Weis discloses an optical system comprising: a sensor(36) for sensing an environmental condition, the sensor providing a first signal(electrical signal) indicative of the sensed environmental condition; a transducer(320) coupled to the sensor for receiving the first signal; and an optical fiber(20) coupled to the transducer, the transducer converting the received first signal to a digital optical signal in the optical fiber, wherein the transducer modulates an optical carrier to(48) to convert the first signal to digital optical signal. Weis also discloses the transducer includes a controllable reflector(330,340,350,360, controlled by modulators 333,343,353,363) operable to modulate an optical carrier(from light source 62) to convert the first signal to the digital optical signal.

With respect to claim 35, per the above discussion, Weis discloses the transducer includes an electromechanical actuator(28) on the optic fiber to modulate an optical carrier(48) in the fiber to convert the first signal to the digital optical signal.

With respect to claim 37, per the above discussion, Weis discloses the sensor has a digital state(col.15,lines 1-20), an analog-to digital converter is inherently disclose in order to convert the signals from analog to digital, thus, the first signal from the sensor is also a digital electrical signal.

With respect to claims 38 and 39, Weis discloses an optical system comprising: a sensor(36) for sensing an environmental condition and providing a first signal indicative of the sensed environmental condition; a transducer(70) coupled to the sensor for receiving the first signal; an optical fiber(20) coupled to the transducer, the transducer converting the received first signal to a digital optical signal in the optical fiber; a recorder(102) recording information based at least in part on the digital optical signal, the recorded information being indicative of the sensed environmental condition; and a light source(62) for providing an optical carrier(48), the transducer operating on the optical carrier to convert the first signal to the digital signal(read col.15).

The system of Weis inherently performs the claimed methods steps of claims 16-19,24,26,27,29,30,40 and 42, since it discloses all the limitations set forth in the mentioned claimed method steps.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

Art Unit: 2878

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 5-8,10,13,20-23,25,28,34,36 and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Weis US5675674.

With respect to claim 5, per the above discussion, although Weis lacks a clear teaching of the digital optical data signals include symbol data indicative of the modulated properties of the modulated optical carrier, using symbol data indicative of the modulated properties and/or additional information of the optical carrier in order to provide better descriptions and/or information of the optical carrier would have been obvious to one of ordinary skill in the art.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Weis accordingly in order to provide more descriptive data for classifying/information purpose, if so desired.

With respect to claim 6, per the above discussion, although Weis discloses that amplitude and frequency modulation of electromagnetic carrier radiation are the backbone of the communication industry, but Weis lacks a clear teaching that the modulated property of includes amplitude.

Selecting a specific modulation property in order to process the optical carrier in a desired form would have been obvious to one of ordinary skill in the art.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Weis accordingly in order to provide a desired form of optical carrier for further processing, if so desired.

With respect to claims 7 and 8, per the above discussion, although Weis discloses the transducer includes a grating(38) for reflecting at least a portion of the optical carrier(col.9, lines 30-55), but Weis lacks a clear teaching of a mirror and/or a micro-machined mirror for reflecting the optical carrier. Selecting a specific type of reflecting element/material/component in order to reflect the optical carrier to a desired optical path would have been obvious to one of ordinary skill in the art.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Weis accordingly in order to provide a desired modulation of light. The further citation of a mirco-machined mirror in claim 8 would have been obvious for similar reasons set forth in the above discussion.

With respect to claim 10, per the above discussion, although Weis discloses the plurality of transducers comprise one or more of a Bragg grating(38) and a piezoelectric crystal(28), but Weis lacks a clear teaching of a liquid crystal device. Using a liquid crystal device in order to provide more control to the modulation of the light would have been obvious to one of ordinary skill in the art.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Weis accordingly in order to provide more control to the modulation of the light of the system.

With respect to claim 13, per the above discussion, although Weis lacks a clear teaching of the one or more sensors operate in a low power state, operating sensors in low power state in order to conserve energy of the sensors would have been obvious to one of ordinary skill in the art.

With respect to claim 34, per the above discussion, the citation regarding to a micromachined reflector would have been obvious for similar reasons set forth in the discussion of claims 7 and 8.

With respect to claim 36, per the above discussion, although Weis discloses a controllable light source(62, read col.14, lines 8-25) but Weis lacks a clear teaching of the transducer activates and/or deactivates the controllable light source in response to the first signal to convert the first signal to the digital optical signal.

Synchronizing the transducer and the controllable light source in order to provide a better signal conversion operation of the system would have been obvious to one of ordinary skill in the art.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Weis accordingly in order to provide a desired synchronization/operation of the system.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Weis accordingly in order to provide energy saving sensors.

Since the proposed system of Weis includes all the limitations set forth in the claims 20-23,25,28 and 41, the proposed system of Weis is obviously capable of performing the above mentioned claimed method steps.

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.



1) Didden et al US6271766 disclose a selectable optic grating-based system for sensing seismic or other parameters.

2) Nelson et al US4313192 disclose an optical transducer array system for use in a multi-channel hydrophone seismic streamer.

3) Siems et al US6522797 disclose a seismic optical acoustic recursive sensor system having internal mirrors with low reflectivity written into the fiber.

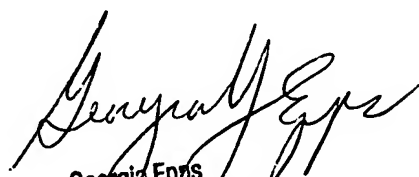
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tony Lu whose telephone number is 5712728448. The examiner can normally be reached on M-F 9:00am- 6:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Georgia Epps can be reached on 5712722328. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



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